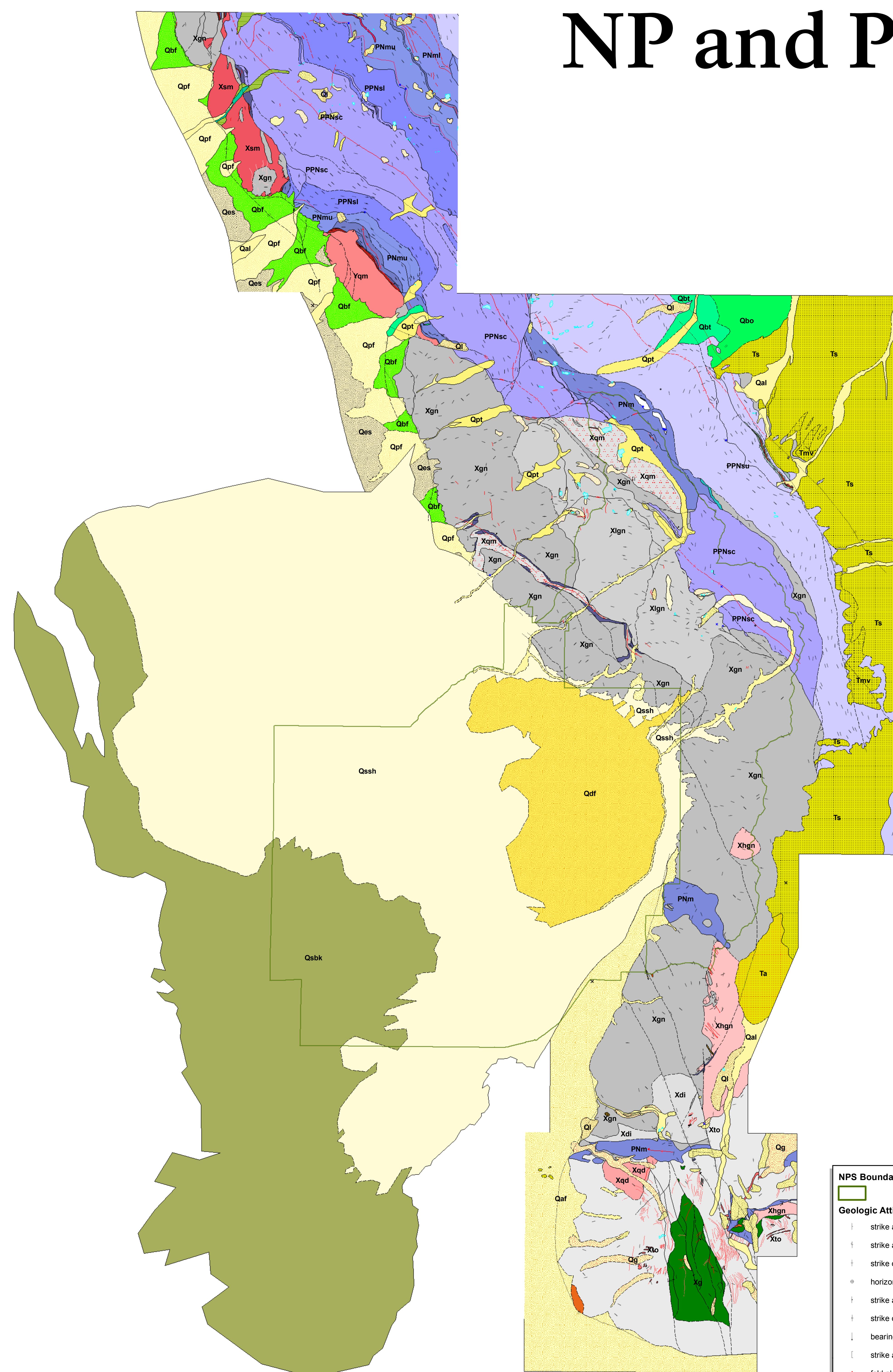




# Geologic Map of Great Sand Dunes NP and PRES



Geologic Units	
Qal - alluvium	
Qaf - alluvial fan deposits	
Qes - eolian sand	
Qdf - dunefield	
Qssh - sand sheet	
Qsbk - sabkha	
Ql - landslide deposits	
Qrf - rockfall deposits	
Qrg - rock-glacier deposits	
Qpu - Pinedale glacial deposits, undifferentiated	
Qpf - Pinedale fan alluvium	
Qpl - Pinedale lacustrine clay	
Qpo - Pinedale outwash	
Qpt - Pinedale till	
Qpbu - Pinedale and Bull Lake glacial deposits, undifferentiated	
Qbf - Bull Lake fan alluvium	
Qbo - Bull Lake outwash	
Qbo2 - Bull Lake young outwash	
Qbt - Bull Lake till	
Qbt2 - Bull Lake young till	
Ts - Sante Fe Formation	
Tgr - granite and granodiorite	
Ta - andesite	
Trm - mafic volcanic rocks	
Tf - felsic dikes	
Tm - mafic dikes	
Jm - Morrison Formation	
Je - Entrada Sandstone	
PPNsu - Sangre de Cristo Formation (undivided)	
PPNscd - Sangre de Cristo Formation, Crestone Member	
PPNsl - Sangre de Cristo Formation, Lower Member	
PNm - Minturn Formation	
PNmu - Minturn Formation, upper part	
PNmuls - Minturn Formation, marker limestone	
PNmcls - Minturn Formation, crinoidal silty limestone	
PNmush - Minturn Formation, shale and siltstone member	
PNmols - Minturn Formation, colite limestone	
PNmt - Minturn Formation, Main turbidite member	
PNmbs - Minturn Formation, biohermal limestone unit	
PNml - Minturn Formation, lower part	
PNmq - Minturn Formation, quartzose red-beds	
MDOR - Mississippian, Devonian and Ordovician Sed Rocks	
Oh - Harding Sandstone	
Om - Manitou Limestone	
Yqm - Quartz Monzonite	
Yqmqz - Quartz Monzonite, vein quartz	
Xp - pegmatite	
Xto - tonalite gneiss	
Xg - metagabbro	
Xqd - quartz diorite	
Xdi - diorite	
Xm - mafic intrusive rocks	
Xqm - quartz monzonite	
Xq - quartzite	
Xsm - syenite and monzonite	
Xgn - leucocratic gneiss	
Xhgn - hornblende gneiss	
Xgn - mixed gneiss	
WATER	

NPS Boundary	Age Date Points	Linear Geologic Units
Geologic Attitude and Observation Points	• paleontological	PNmuls - Minturn Formation, marker limestone
	strike and dip of beds	PNmcls - Minturn Formation, crinoidal silty limestone
	strike and dip of overturned beds	PNmubs - Minturn Formation, brown weathering limestone
	strike and dip of vertical beds	PNmups - Minturn Formation, phylloidal algal limestone
	horizontal beds	PNmols - Minturn Formation, colite limestone
	strike and dip of foliation	Tf - felsite dike,
	strike and dip of lineation	Tm - mafic rock dike
	bearing and plunge of lineation	Yqmqz - vein quartz
	strike and dip of cleavage	Xp - pegmatite dike
	fold plunge arrow head	Xm - mafic intrusives
	dip of fault plane	known
	upthrown side of fault	approximate
	downthrown side of fault	approximate, queried
	monocline	map boundary
	anticline	shoreline
	syncline	
	overturned anticline	
	overturned syncline	
	monocline, anticinal bend	

The original maps digitized by NPS staff to create this product were:

Lindsey, David A., Souliere, Sandra J., Hafner, Katrin., and Flores, R.J., 1985, Geologic Map of Rito Alto Peak and Northeastern part of Mirage Quadrangle, Custer and Saguache Counties, Colorado: U.S. Geological Survey, Miscellaneous Field Studies Map MF-1787, scale 1:24,000.

Lindsey, David A., Johnson, Bruce R., Souliere, Sandra J., Bruce, Robert M., and Hafner, Katrin, 1986, Geologic Map of the Beck Mountain, Crestone Peak, and Crestone Quadrangles, Custer, Huerfano, and Saguache Counties, Colorado: U.S. Geological Survey, Miscellaneous Field Studies Map MF-1878, 1:24,000 scale.

Johnson, Bruce R., Bruce, Robert M., and Lindsey, David A., 1989, Reconnaissance Geologic Map of the Medano Pass Quadrangle and part of the Liberty Quadrangle, Alamosa, Huerfano, and Saguache Counties, Colorado: U.S. Geological Survey, Miscellaneous Field Studies Map MF-2089, scale 1:24,000.

Bruce, Robert M., and Johnson, Bruce R., 1991, Reconnaissance Geologic Map of parts of the Zapata Ranch and Mosca Pass Quadrangles, Alamosa and Huerfano Counties, Colorado: U.S. Geological Survey, Miscellaneous Field Studies Map MF-2168, scale 1:24,000.

Johnson, Bruce R., and Bruce, Robert M., 1991, Reconnaissance Geologic Map of parts of the Twin Peaks and Blanca Peak Quadrangles, Alamosa, Costilla, and Huerfano Counties, Colorado: U.S. Geological Survey, Miscellaneous Field Studies Map MF-2169, scale 1:24,000.

Valdez, Andrew, 2000, unpublished geologic mapping of Great Sand Dunes National Park, Colorado.

Digital geologic data and cross sections for Great Sand Dunes National Park and Preserve, and all other digital geologic data prepared as part of the Geologic Resources Division's Geologic Resource Evaluation program, are available online at [http://www2.nature.nps.gov/geology/inventory/gre\\_publications.cfm](http://www2.nature.nps.gov/geology/inventory/gre_publications.cfm)

